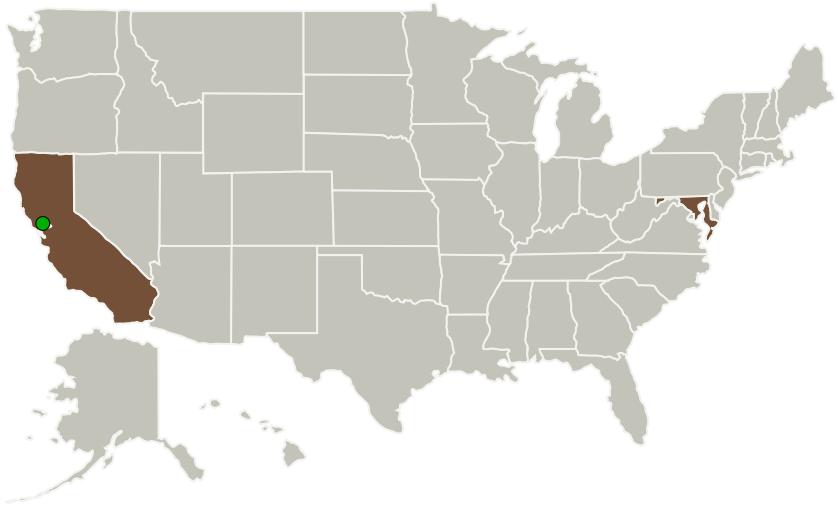
Photoacoustic Multicomponent Analyzer for Atmospheric Compounds, Phase I

Completed Technology Project (2010 - 2010)

Project Introduction

We propose to build a compact, rugged field-deployable laser photoacoustic spectrometric (LPAS) sensor for continuous, real-time measurements of multiple chemical components, and perform field tests to qualify it for dynamic monitoring of Water Vapor, Carbon Dioxide (12CO2 and 13CO2), Carbon Monoxide, Methane, Ozone, Reactive and Trace Gases. Our sensor will be based on our laboratory LPAS instrument (at technology readiness level TRL-4)that has already demonstrated successful alcohol detection in presence of water vapor. It utilizes a tunable infrared laser (interband cascade or quantum cascade), a high sensitivity photoacoustic cell with an air sampler and an efficient algorithm to rapidly complete high sensitivity, selective multi-component measurements in under a minute. In Phase I we will carry out extensive laboratory tests of LPAS with standard samples, and a comprehensive analysis of the sensor performance using a model to determine the limit of detection (LOD) and receiver operating characteristic (ROC) curves for the sensor and establish its feasibility. A rugged and portable prototype sensor (TRL-5) will be built in Phase II. It will be field tested in open environment with artificially loaded target gases (TRL-6) and characterize the sensor.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
Masstech, Inc.	Lead Organization	Industry Small Disadvantaged Business (SDB), Minority-Owned Business	Columbia, Maryland
Ames Research Center(ARC)	Supporting Organization	NASA Center	Moffett Field, California

Primary U.S. Work Locations	
California	Maryland

Project Transitions

January 2010: Project Start

July 2010: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/139329)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Masstech, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

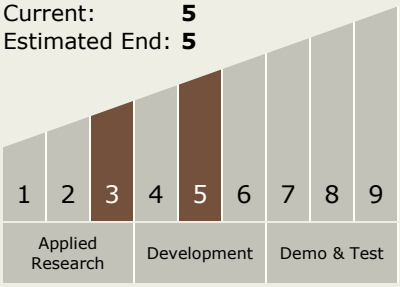
Carlos Torrez

Principal Investigator:

Guangkun Li

Technology Maturity (TRL)

Start: **3**
Current: **5**
Estimated End: **5**



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Technology Areas

Primary:

- TX08 Sensors and Instruments
  - TX08.3 In-Situ Instruments and Sensors
    - TX08.3.2 Atomic and Molecular Species Assessment

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System